and is effected by energy derived from lactic acid production,[3] hence it was not until the lactic acid cycle was removed from the picture that the significance of phosphagen could be appreciated.

In these experiments the question of the specificity of IA arises. Is it a general enzymic poison or does it act particularly on enzymes important in the lactic acid or Meyerhof cycle? Present evidence favors the latter view. For example, Lundsgaard found that IA affected neither glycogenolysis nor phosphagen hydrolysis in concentrations which completely suppressed the Meyerhof cycle (one part in 25,000). It does not disturb the action of ptyalin or of invertase,[5] and while it checks yeast fermentation (a process very like lactic acid formation[6]) Lundsgaard reports that it does not interfere with the oxidative metabolism of yeast.

What are the features of "alactic acid contraction"? Apparently the electrical and mechanical responses in the isometric twitch are quite normal in the early members of a series of contractions[8] although the onset of fatigue is more abrupt, and the muscle will perform only about a fourth as much work as in the absence of IA.[3]

Rather complicated changes occur in the thermal response. In previous papers[9] it was pointed out that the heat production in an isometric twitch is diphasic. The first phase, the "initial heat" of A. V. Hill is concomitant with contraction and relaxation and is anaërobic, while the second phase, "recovery heat," follows the mechanical response and is chiefly aërobic. The initial heat in turn is diphasic, 65 to 70 per cent being associated with contraction, 35 to 30 per cent with relaxation. IA has little effect on the amount or distribution of the initial heat in the first few contractions of a series, but if the poisoned muscle be stimulated to complete exhaustion the total anaërobic heat is reduced some 58 per cent.[10, 11]

The recovery heat is also affected. Little changed in the first few contractions of a series, it soon begins to decrease more rapidly than the initial heat. A. V. Hill and coworkers have inferred a dual rôle for IA: an action upon the lactic acid forming system; and an action upon a system using energy from oxidation for recovery (resynthesis of phosphagen, etc.).[12] Systems of the latter type exist, since muscles poisoned with IA will do more work in oxygen than in nitrogen.

Some generalities are interesting. Warburg[13] and others have shown that the Meyerhof cycle is of widespread occurrence, being especially notable in embryonic and cancerous tissue. In muscle, IA interferes with the cycle by poisoning glyoxalase, the enzyme catalysing the formation of lactic acid from its immediate precursor, methyl glyoxal;[14] of course previously linked reactions may also be checked. While the mechanism of lactic acid production in cancer is probably unlike that in muscle, Harrison and Mellanby found that IA inhibits the Meyerhof cycle in mouse carcinoma 63, both *in vitro* and *in vivo* (intravenous injection). It must be emphasized that lethal doses of the very poisonous IA were required to produce the latter effect.[15]

In summary: The rediscovery of the Pohl effect has caused fundamental changes in our conception of the rôle of the Meyerhof cycle in functional metabolism. It has also placed in our hands interesting and valuable reagents for analyzing carbohydrate metabolism, viz., the monohalogenated acetic acids. We may reasonably look for significant increase in our knowledge of the animal economy in consequence.

JOHN FIELD, Stanford University.

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Alleged Mobilization of Antibodies in Nervous Tissues.—It is generally believed that unless the meninges are inflamed, humoral antibodies rarely penetrate in effective amounts into the cerebrospinal fluid. The practical conclusion has been drawn that in brain and cord infections therapeutic antisera are most effective if injected by lumbar puncture. Uncertainty as to the validity of this conclusion is expressed by Dr. Jules Freund of the Phipps Institute, Philadelphia,[1] who for the first time has compared quantitatively the antibody content of the brain and surrounding fluids.

Doctor Freund found that in rabbits, when the penetration of typhoid agglutinins from the blood stream into the cerebrospinal fluid is complete, the numerical relationship between the specific titer of the rabbit's serum and spinal fluid is 400:1. The corresponding antibody ratio in the serum and brain is 125:1. Which means that the antibody concentration is three times higher in the brain than in the surrounding fluid. Moreover, this relatively high titer in the nervous tissues is reached within ten minutes after intravenous injection of an antiserum, while the maximum in the cerebrospinal fluid is delayed for many hours.

Doctor Freund concludes from this evidence that the cerebrospinal fluid is not the immediate source of effective central nervous system antibodies, and that there is no physiological reason for the current belief in the increased efficiency of local injections. Whether or not the central nervous system antibodies measured by him are contained in the nerve cells or in the local reticuloendothelial system has not yet been determined.

W. H. MANWARING, Stanford University.

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